

Table 0-1 Subscription Tunables

COMMUNICATIONS TUNABLES				
Tunable Name	Tunable Variable Name	Default Value	Units	Valid Range
Subscription Activation Retry Attempts	Subscription_Version_Activation_Retry	3	attempts	1-10
The number of times a new subscription version will be sent to a Local SMS which has not acknowledged receipt of the activation request.				
Subscription Activation Retry Interval	Subscription_Version_Activation_Retry_Interval	2	minutes	1-60
The delay between sending new Subscription Versions to a Local SMS that has not acknowledged receipt of the activation request.				
Subscription Modification Retry Attempts	Subscription_Version_Modification_Retry	3	attempts	1-10
The number of times a modified active subscription version will be sent to a Local SMS which has not acknowledged receipt of the modification request.				
Subscription Modification Retry Interval	Subscription_Version_Modification_Retry_Interval	2	minutes	1-60
The delay between sending modified active subscription versions to a Local SMS that has not acknowledged receipt of the modification request.				
Subscription Disconnect Retry Attempts	Subscription_Version_Disconnect_Retry	3	attempts	1-10
The number of times the NPAC SMS will resend a subscription disconnect message to an unresponsive Local SMS.				
Subscription Disconnect Retry Interval	Subscription_Version_Disconnect_Retry_Interval	2	minutes	1-60
The amount of time that shall elapse between subscription disconnect retries.				
Local SMS Retry Attempts	LSMS_Retry_Attempts	3	attempts	1-10
The default number of times the NPAC SMS will resend a message to an unresponsive Local SMS.				

COMMUNICATIONS TUNABLES				
Tunable Name	Tunable Variable Name	Default Value	Units	Valid Range
Record Logons After Failure	Record_Logons_After_Failure	10	attempts	0-100
The threshold for consecutive failed logon attempts after which logon attempts will be recorded in the audit log.				
Non-Use Disconnect	Non_Use_Disconnect	60	minutes	1-1440
The amount of idle (non-use) time before the NPAC SMS will disconnect a user's logon session.				
Maximum Number of Download Records	Maximum_Number_Download_Records	10000	records	1-200000
The maximum number of records for a single data download.				
Maximum Download Duration	Maximum_Download_Duration	60	minutes	1-1440
The maximum time range allowed for a data download.				

Table 0-2 Communications Tunables

AUDIT TUNABLES				
Tunable Name	Tunable Variable Name	Default Value	Units	Valid Range
Canceled Audit Retention Period	Canceled_Audit_Retention_Period	30	days	1-360
The length of time canceled audits will be retained.				
Data Integrity Sample Size	Data_Integrity_Sample_Size	1000	SVs	1-5000
The number of active Subscription Versions in a sample to be monitored by the NPAC SMS.				
Data Integrity Sample Frequency	Data_Integrity_Sample_Frequency	7	Days	1-90
The interval in days between Data Integrity Samples conducted by the NPAC SMS.				

AUDIT TUNABLES				
Tunable Name	Tunable Variable Name	Default Value	Units	Valid Range
Subscription Query Record Limit	Subscription_Query_Record_Limit	50	Subscriptions	1-5000
The maximum number of records that can be returned from a query.				

Table 0-3 Audit Tunables

LOGS TUNABLES				
Tunable Name	Tunable Variable Name	Default Value	Units	Valid Range
Local SMS Activation Log Retention Period	Local_SMS_Activation_Log_Duration	90	days	1-360
The number of days Local SMS activation responses will remain in the log.				
Audit Log Retention Period	Audit_Log_Retention_Period	90	days	1-360
The length of time audit logs will be retained.				
Error Log Retention Period	Error_Log_Retention_Period	90	days	1-360
The length of time system error logs will be retained.				
History File Data Storage	History_File_Data_Storage	365	days	1-365
The length of time history logs will be retained.				
Usage Log Retention	Usage_Log_Retention	90	days	1-360
The length of time usage logs will be retained.				

Table 0-4 Logs Tunables

KEYS TUNABLES				
Tunable Name	Tunable Variable Name	Default Value	Units	Valid Range
Key Change Interval	Key_Change_Interval	7	days	1-365
How often the key is changed automatically.				

Table 0-5 Keys Tunables

**NORTH AMERICAN NUMBERING COUNCIL
LNPA TECHNICAL & OPERATIONAL REQUIREMENTS TASK FORCE
REPORT**

APPENDIX D

**NANC INTEROPERABLE INTERFACE
SPECIFICATION**

**NORTH AMERICAN NUMBERING COUNCIL
LNPA TECHNICAL & OPERATIONAL REQUIREMENTS TASK FORCE
REPORT**

The NANC Interoperable Interface Specification (NANC IIS) document is available at the following website:

<http://www.npac.com>

[REDACTED]

NPAC SMS
INTEROPERABLE INTERFACE SPECIFICATION

NANC Version 1.05.1

Prepared for:

Prepared for:

~~The Illinois Commerce Commission SMS Subcommittee~~ The North American Numbering Council
(NANC)

By:

~~Lockheed Martin IMS and Evolving Systems, Inc. (ESI)~~

April 7, 1997 ~~March 14, 1997~~

NPAC SMS

INTEROPERABLE INTERFACE SPECIFICATION

NANC Version 1.05.1

Prepared for:

The Illinois Commerce Commission SMS Subcommittee The North American Numbering Council
(NANC)

By:

~~Lockheed Martin IMS and Evolving Systems, Inc. (ESI)~~

April 7, 1997 ~~March 14, 1997~~

© 1997 LOCKHEED MARTIN IMS CORPORATION

The Work is subject to the terms of the GNU General Public License (the "GPL"), a copy of which may be found at [ftp://prep.ai.mit.edu/pub/gnu/GPL](http://prep.ai.mit.edu/pub/gnu/GPL). Any use of this Work is subject to the terms of the GPL. The "Work" covered by the GPL by operation of this notice and license is this document and any and all modifications to or derivatives of this document. Where the words "Program," "software," "source code," "code," or "files" are used in the GPL, users understand and agree that the "Work" as defined here is substituted for purposes of this notice and license.

Table Of Contents

1. Introduction	2
1.1. Document Overview	2
1.2. How To Use This Document	2
1.3. Document Version History	3
1.4. References.....	7
1.4.1. Standards.....	7
1.4.2. Related Publications.....	9
1.5. Abbreviations/Definitions	10
2. Interface Overview.....	12
2.1. Overview	12
2.2. OSI Protocol Support.....	12
2.3. SOA to NPAC SMS Interface.....	13
2.3.1. Subscription Administration	13
2.3.2. Audit Requests	13
2.3.3. Notifications.....	13
2.3.4. Service Provider Data Administration	14
2.4. NPAC SMS to Local SMS Interface	14
2.4.1. Subscription Version and Network Data Download.....	14
2.4.2. Service Provider Data Administration	14
2.4.3. Notifications.....	15
3. Hierarchy Diagrams	16
3.1. Overview	16
3.1.1. Managed Object Model Inheritance Hierarchy.....	16
3.1.2. Log Record Managed Object Hierarchy	18
3.1.3. NPAC SMS to Local SMS Naming Hierarchy for the NPAC SMS	19
3.1.4. NPAC SMS to Local SMS Naming Hierarchy for the Local SMS.....	20
3.1.5.SOA to NPAC SMS Naming Hierarchy for the NPAC SMS	21
4. Interface Functionality to CMIP Definition Mapping	22
4.1. Overview	22
4.1.1. Primary NPAC Mechanized Interface Operations	22
4.1.2. Managed Object Interface Functionality.....	25
4.1.3. Attribute Interface Functionality.....	27
4.1.4. Action Interface Functionality	37
4.1.5. Notification Interface Functionality	38
4.2. Scoping and Filtering Support	41
4.2.1. Scoping	41
4.2.2. Filtering.....	41
4.3. InpLocal-SMS-Name and InpNPAC-SMS-Name Values.....	42

5. Secure Association Establishment.....	44
5.1. Overview.....	44
5.2. Security	44
5.2.1. Authentication and Access Control Information.....	45
5.2.1.1. System Id	46
5.2.1.2. System Type	46
5.2.1.3. User Id	46
5.2.1.4. List Id.....	46
5.2.1.5. Key Id	46
5.2.1.6. CMIP Departure Time	46
5.2.1.7. Sequence Number.....	46
5.2.1.8. Association Functions.....	47
5.2.1.9. Recovery Mode.....	48
5.2.1.10. Signature	48
5.2.2. Association Establishment.....	48
5.2.3. Data Origination Authentication.....	50
5.2.4. Audit Trail.....	51
5.3. Association Management and Recovery.....	52
5.3.1. Establishing Associations	52
5.3.1.1. NpacAssociationUserInfo	52
5.3.1.2. Unbind Requests and Responses.....	53
5.3.1.3. Aborts	53
5.3.1.4. NPAC SMS Behavior	53
5.3.1.5. Service Provider SOA and Local SMS Procedures	53
5.3.2. Releasing or Aborting Associations.....	55
5.3.3. Error Handling	55
5.3.3.1. NPAC SMS Error Handling.....	55
5.3.3.2. Processing Failure Error	55
5.3.4. Resynchronization	56
5.3.4.1. Local SMS Resynchronization.....	56
5.3.4.2. SOA Resynchronization.....	56
6. Message Flow Diagrams	58
6.1. Overview.....	58
6.2. Audit Scenarios	59
6.2.1. SOA Initiated Audit.....	59
6.2.2. SOA Initiated Audit Cancellation by the SOA	61
6.2.3. SOA Initiated Audit Cancellation by the NPAC.....	62
6.2.4. NPAC Initiated Audit	63
6.2.5. NPAC Initiated Audit Cancellation by the NPAC	64
6.2.6. Audit Query on the NPAC.....	65
6.3. Service Provider Scenarios	66
6.3.1. Service Provider Creation by the NPAC.....	66
6.3.2. Service Provider Deletion by the NPAC.....	67
6.3.3. Service Provider Modification by the NPAC.....	69
6.3.4. Service Provider Modification by the Local SMS	70
6.3.5. Service Provider Modification by the SOA	71
6.3.6. Service Provider Query by the Local SMS	72
6.3.7. Service Provider Query by the SOA	73

6.4. Service Provider Network Data Scenarios	74
6.4.1. NPA-NXX Scenarios	74
6.4.1.1. NPA-NXX Creation by the NPAC	74
6.4.1.2. NPA-NXX Deletion by the NPAC	75
6.4.1.3. NPA-NXX Creation by the Local SMS	76
6.4.1.4. NPA-NXX Creation by the SOA	77
6.4.1.5. NPA-NXX Deletion by the Local SMS	78
6.4.1.6. NPA-NXX Deletion by the SOA	79
6.4.1.7. NPA-NXX Query by the Local SMS.....	80
6.4.1.8. NPA-NXX Query by the SOA.....	81
6.4.2. LRN Scenarios	82
6.4.2.1. LRN Creation by the NPAC	82
6.4.2.2. LRN Creation by the SOA.....	83
6.4.2.3. LRN Deletion by the SOA	84
6.4.2.4. LRN Query by the SOA.....	85
6.4.2.5. LRN Deletion by the NPAC	86
6.4.2.6. LRN Creation by the Local SMS	87
6.4.2.7. LRN Deletion by the Local SMS.....	88
6.4.2.8. LRN Query by the Local SMS.....	89
6.4.2.9. Network Data Download	90
6.4.2.10. Scoped/Filtered GET of Network Data.....	91
6.4.2.11. Scoped/Filtered GET of Network Data from SOA	92
6.5. Subscription Version Flow Scenarios	93
6.5.1. SubscriptionVersion Create Scenarios.....	93
6.5.1.1. SubscriptionVersion Create by the Initial SOA (Old Service Provider).....	94
6.5.1.2. SubscriptionVersion Create by the Initial SOA (New Service Provider)	96
6.5.1.3. SubscriptionVersion Create by Second SOA (New Service Provider).....	98
6.5.1.4. SubscriptionVersion Create by Second SOA (Old Service Provider)	100
6.5.1.5. SubscriptionVersion Activated by New Service Provider SOA	102
6.5.1.6. Active SubscriptionVersion Create on Local SMS.....	104
6.5.1.7. SubscriptionVersionCreate M-CREATE Failure to Local SMS.....	112
6.5.1.8. SubscriptionVersion M-CREATE: Partial Failure to Local SMS.....	114
6.5.1.9. Create Subscription Version: Resend Successful to Local SMS Action.....	116
6.5.1.10. Subscription Version: Resend Failure to Local SMS.....	118
6.5.1.11. SubscriptionVersion Create for Intra-Service Provider Port.....	120
6.5.2. Modify Scenarios.....	122
6.5.2.1. SubscriptionVersion Modify Active Version Using M-ACTION by a Service Provider SOA	122
6.5.2.2. SubscriptionVersion Modify Active: Failure to Local SMS.....	125
6.5.2.3. SubscriptionVersion Modify Prior to Activate Using M-ACTION	127
6.5.2.4. SubscriptionVersion Modify Prior to Activate Using M-SET	129
6.5.2.5. Subscription Version Modify Active: Resend Successful to Local SMS	131
6.5.2.6. Subscription Version Modify Active: Resend Failure to Local SMS	133
6.5.3. Cancel Scenarios.....	135
6.5.3.1. SubscriptionVersion Cancel by Service Provider SOA After Both Service Provider SOAs Have Concurred	135
6.5.3.2. SubscriptionVersionCancel: No Acknowledgment from a SOA	137
6.5.3.3. Subscription Version Cancels With Only One Create Action Received.....	139
6.5.4. Disconnect Scenarios	141
6.5.4.1. SubscriptionVersion Immediate Disconnect.....	141
6.5.4.2. SubscriptionVersion Disconnect With Effective Release Date.....	143
6.5.4.3. SubscriptionVersion Disconnect: Failure to Local SMS	145
6.5.4.4. SubscriptionVersion Disconnect: Partial Failure to Local SMS	147

6.5.4.5. Subscription Version Disconnect: Resend Successful to Local SMS	149
6.5.4.6. Subscription Version Disconnect: Resend Failure to Local SMS.....	151
6.5.5. Conflict Scenarios	153
6.5.5.1. Subscription Version Conflict and Conflict Resolution by the NPAC SMS	153
6.5.5.2. Subscription Version Conflict Removal by the New Service Provider SOA	155
6.5.5.3. Subscription Version Conflict: No Conflict Resolution	156
6.5.5.4. Subscription Version Conflict by Old Service Provider Explicitly Not Authorizing (First Create)....	158
6.5.6. Subscription Version Query.....	160
6.5.6.1. Subscription Data Download	162
6.6. LSMS Filter NPA-NXX Scenarios	163
6.6.1. lsmsFilterNPA-NXX Creation by the Local SMS	163
6.6.2. lsmsFilterNPA-NXX Deletion by the Local SMS	164
6.6.3. lsmsFilterNPA-NXX Query by the Local SMS	165
6.6.4. lsmsFilterNPA-NXX Creation by the SOA	166
6.6.5. lsmsFilterNPA-NXX Deletion by the SOA	167
6.6.6. lsmsFilterNPA-NXX Query by the SOA	168
6.7. Miscellaneous	169
6.7.1. Sequencing of Events on Initialization/Resynchronization of Local SMS	169
6.7.2. SOA/Local SMS Notification of Scheduled NPAC Downtime.....	170
6.7.3. NPA-NXX Split.....	171
6.7.4. Mass Update	172
7. GDMO Definitions	174
7.1. Overview	174
7.2. -- Object Definitions	174
7.3. -- Name Binding Definitions	196
7.4. -- Attribute Definitions.....	199
7.5. -- Package Definitions.....	222
7.6. -- Parameter Definitions.....	227
7.7. -- Action Definitions.....	227
7.8. -- Notification Definitions.....	237
8. General ASN.1 Definitions.....	242
8.1. Overview.....	242
8.2. LNP ASN.1 Object Identifier Definitions.....	242
8.3. LNP General ASN.1 Definitions.....	242
9. Managed Object Conformance Statements	256
9.1. Overview.....	256
9.2. InpAudits Tables	256
9.2.1. InpAudits Packages.....	256
9.2.2. InpAudits Name Bindings.....	256
9.2.3. InpAudits Attributes.....	257
9.2.4. InpAudits Actions	257

9.2.5. InpAudits Notifications	257
9.3. InpLocalSMS Tables.....	257
9.3.1. InpLocalSMS Packages	257
9.3.2. InpLocalSMS Name Bindings	258
9.3.3. InpLocalSMS Attributes	258
9.3.4. InpLocalSMS Actions	258
9.3.5. InpLocalSMS Notifications.....	259
9.4. InpLogAudit-DiscrepancyRptRecord Tables.....	260
9.4.1. InpLogAudit-DiscrepancyRptRecord Packages.....	260
9.4.2. InpLogAudit-DiscrepancyRptRecord Name Bindings.....	260
9.4.3. InpLogAudit-DiscrepancyRptRecord Attributes	260
9.4.4. InpLogAudit-DiscrepancyRptRecord Actions	260
9.4.5. InpLogAudit-DiscrepancyRptRecord Notifications.....	260
9.5. InpLogAuditResultsRecord Tables	261
9.5.1. InpLogAuditResultsRecord Packages.....	261
9.5.2. InpLogAuditResultsRecord Name Bindings.....	261
9.5.3. InpLogAuditResultsRecord Attributes	261
9.5.4. InpLogAuditResultsRecord Actions	261
9.5.5. InpLogAuditResultsRecord Notifications.....	261
9.6. InpLogCancellationAcknowledgeRequestRecord	262
9.6.1. InpLogCancellationAcknowledgeRequest Packages	262
9.6.2. InpLogCancellationAcknowledgeRequest Name Bindings	262
9.6.3. InpLogCancellationAcknowledgeRequest Attributes	262
9.7. InpLogNewSP-CreateRequestRecord Tables	263
9.7.1. InpLogNewSP-CreateRequestRecord Packages	263
9.7.2. InpLogNewSP-CreateRequestRecord Name Bindings	263
9.7.3. InpLogNewSP-CreateRequestRecord Attributes	263
9.7.4. InpLogNewSP-CreateRequestRecord Actions	263
9.7.5. InpLogNewSP-CreateRequestRecord Notifications	263
9.8. InpLogOldSP-ConcurrenceRequestRecord Tables	264
9.8.1. InpLogOldSP-ConcurrenceRequestRecord Packages	264
9.8.2. InpLogOldSP-ConcurrenceRequestRecord Name Bindings	264
9.8.3. InpLogOldSP-ConcurrenceRequestRecord Attributes	264
9.8.4. InpLogOldSP-ConcurrenceRequestRecord Actions	264
9.8.5. InpLogOldSP-ConcurrenceRequestRecord Notifications	265
9.9. InpLogOperational-InformationRecord Tables	265
9.9.1. InpLogOperational-InformationRecord Packages	265
9.9.2. InpLogOperational-InformationRecord Name Bindings	265
9.9.3. InpLogOperational-InformationRecord Attributes	265
9.9.4. InpLogOperational-InformationRecord Actions	265
9.9.5. InpLogOperational-InformationRecord Notifications	266
9.10. InpLogStatusAttributeValueChangeRecord Tables.....	266
9.10.1. InpLogStatusAttributeValueChangeRecord Packages	266
9.10.2. InpLogStatusAttributeValueChangeRecord Name Bindings	266
9.10.3. InpLogStatusAttributeValueChangeRecord Attributes	266
9.10.4. InpLogStatusAttributeValueChangeRecord Actions	266
9.10.5. InpLogStatusAttributeValueChangeRecord Notifications	267
9.10.6. InpNetwork Packages.....	267

Table of Contents

9.10.7. lnpNetwork Name Bindings	267
9.10.8. lnpNetwork Attributes	267
9.10.9. lnpNetwork Actions	268
9.10.10. lnpNetwork Notifications.....	269
9.11. lnpNPAC-SMS Tables.....	269
9.11.1. lnpNPAC-SMS Packages.....	269
9.11.2. lnpNPAC-SMS Name Bindings.....	270
9.11.3. lnpNPAC-SMS Attributes.....	270
9.11.4. lnpNPAC-SMS Actions	270
9.11.5. lnpNPAC-SMS Notifications.....	272
9.12. lnpServiceProvs Tables	272
9.12.1. lnpServiceProvs Packages	272
9.12.2. lnpServiceProvs Name Bindings	272
9.12.3. lnpServiceProvs Attributes	272
9.12.4. lnpServiceProvs Actions	273
9.12.5. lnpServiceProvs Notifications.....	273
9.13. lnpSubscriptions Tables	273
9.13.1. lnpSubscriptions Packages.....	273
9.13.2. lnpSubscriptions Name Bindings.....	273
9.13.3. lnpSubscriptions Attributes.....	274
9.13.4. lnpSubscriptions Actions	274
9.13.5. lnpSubscriptions Notifications.....	281
9.14. serviceProv Tables	281
9.14.1. serviceProv Packages.....	281
9.14.2. serviceProv Name Bindings.....	282
9.14.3. serviceProv Attributes	282
9.14.4. serviceProv Actions	282
9.14.5. serviceProv Notifications.....	282
9.15. serviceProvLRN Tables.....	282
9.15.1. serviceProvLRN Packages.....	282
9.15.2. serviceProvLRN Name Bindings.....	283
9.15.3. serviceProvLRN Attributes	283
9.15.4. serviceProvLRN Actions	283
9.15.5. serviceProvLRN Notifications.....	283
9.16. serviceProvNetwork Tables	284
9.16.1. serviceProvNetwork Packages	284
9.16.2. serviceProvNetwork Name Bindings.....	284
9.16.3. serviceProvNetwork Attributes	284
9.16.4. serviceProvNetwork Actions	284
9.16.5. serviceProvNetwork Notifications.....	284
9.17. serviceProvNPA-NXX Tables.....	285
9.17.1. serviceProvNPA-NXX Packages	285
9.17.2. serviceProvNPA-NXX Name Bindings.....	285
9.17.3. serviceProvNPA-NXX Attributes	285
9.17.4. serviceProvNPA-NXX Actions	285
9.17.5. serviceProvNPA-NXX Notifications.....	286
9.18. subscriptionAudit Tables	286
9.18.1. subscriptionAudit Packages	286

9.18.2. subscriptionAudit Name Bindings	286
9.18.3. subscriptionAudit Attributes	286
9.18.4. subscriptionAudit Actions	287
9.18.5. subscriptionAudit Notifications	287
9.19. subscriptionVersion Tables	289
9.19.1. subscriptionVersion Packages	289
9.19.2. subscriptionVersion Name Bindings	289
9.19.3. subscriptionVersion Attributes	290
9.19.4. subscriptionVersion Actions	290
9.19.5. subscriptionVersion Notifications	290
9.20. subscriptionVersionNPAC Tables	290
9.20.1. subscriptionVersionNPAC Packages	290
9.20.2. subscriptionVersionNPAC Name Bindings	291
9.20.3. subscriptionVersionNPAC Attributes	291
9.20.4. subscriptionVersionNPAC Actions	291
9.20.5. subscriptionVersionNPAC Notifications	292
9.21. lnLogDonorSP-CustomerDisconnectDateRecord Tables	293
9.21.1. lnLogDonorSP-CustomerDisconnectDateRecord Packages	293
9.21.2. lnLogDonorSP-CustomerDisconnectDateRecord Name Bindings	293
9.21.3. lnLogDonorSP-CustomerDisconnectDateRecord Attributes	294
9.21.4. lnLogDonorSP-CustomerDisconnectDateRecord Actions	294
9.21.5. lnLogDonorSP-CustomerDisconnectDateRecord Notifications	294
9.22. lnLogLocalSMS-ActionResultsRecord Tables	294
9.22.1. lnLogLocalSMS-ActionResultsRecord Packages	294
9.22.2. lnLogLocalSMS-ActionResultsRecord Name Bindings	295
9.22.3. lnLogLocalSMS-ActionResultsRecord Attributes	295
9.22.4. lnLogLocalSMS-ActionResultsRecord Actions	295
9.22.5. lnLogLocalSMS-ActionResultsRecord Notifications	295
9.23. lnLogNewNPA-NXXRecord Tables	295
9.23.1. lnLogNewNPA-NXXRecord Packages	295
9.23.2. lnLogNewNPA-NXXRecord Name Bindings	296
9.23.3. lnLogNewNPA-NXXRecord Attributes	296
9.23.4. lnLogNewNPA-NXXRecord Actions	296
9.23.5. lnLogNewNPA-NXXRecord Notifications	296
9.24. lsmsFilterNPA-NXX Tables	296
9.24.1. lsmsFilterNPA-NXX Packages	296
9.24.2. lsmsFilterNPA-NXX Name Bindings	297
9.24.3. lsmsFilterNPA-NXX Attributes	297
9.24.4. serviceProvNPA-NXX Actions	297
9.24.5. serviceProvNPA-NXX Notifications	297
10. Subscription Version Status	298
Appendix A: Errors	292

1. Introduction

1

1.1. Document Overview

The NPAC SMS Interoperable Interface Specification contains the information model for the Number Portability Administration Center and Service Management System (NPAC SMS) mechanized interfaces. Both Service Order Activation (SOA) and Local Service Management System (LSMS or Local SMS) interfaces to the NPAC SMS are described in this document.

1.2. How To Use This Document

The NPAC SMS Interoperable Interface Specification contains the following chapters:

Chapter 1 **Introduction** -- This chapter describes the conventions and organization of this document. It also lists related documentation.

Chapter 2 **Interface Overview** -- This chapter contains an overview of protocol requirements and a brief description of the functionality provided in each interface.

Chapter 3 **Hierarchy Diagrams** -- This chapter contains the class hierarchy diagrams for all managed objects defined in the interoperable interface.

Chapter 4 **Interface Functionality to CMIP Definition Mapping** -- This chapter contains the mapping of the interface functionality to the managed objects, attributes, actions, and notifications.

Chapter 5 **Secure Association Establishment** -- This chapter contains information on secure association establishment.

Chapter 6 **Message Flow Diagrams** -- This chapter contains the message flow diagrams.

Chapter 7 **GDMO Definitions** -- This chapter contains the GDMO interface definitions supporting the SOA to NPAC SMS interface and the NPAC SMS to Local SMS interface

Chapter 8 **General ASN.1 Definitions** -- This chapter contains the ASN.1 definitions that support the GDMO definitions in Chapter 7.

Chapter 9 **Managed Object Conformance Statements** -- This chapter contains the Managed Object Conformance tables.

Chapter 10 **Subscription Version Status** -- This chapter contains a Subscription Version Status diagram, which illustrates the transition from one subscription version state to another.

Appendix A Errors -- This appendix contains the valid errors associated with CMISE confirmed primitives used in the interoperable interface definitions.

1.3. Document Version History

~~Version 1.0 Draft 2, released on 8/15/96.~~

~~Version 1.0 Draft 3, released on 9/17/96.~~

~~Version 1.0 FINAL, released on 10/01/96.~~

~~Version 1.1, released on 11/18/96.~~

~~Version 1.2, released on 11/18/96.~~

~~Version 1.3, released on 01/01/97.~~

~~Version 1.4, released on 02/01/97.~~

NANC Version 1.05, released on 04/07/97, contains the following changes from the ICC SMS Subcommittee IIS Version 1.5.1:

Change Order 181 - Additional key information added to section 5.2.1.5.

Change Order NANC 13 - Notification of T2 expiration to Old SP added to section 3, section 4 and flow 6.5.1.6.3.

Change Order 103 - Clarify title of cancellation acknowledgement.

GDMO updated.

Change Order 114 - Miscellaneous notification corrections.

GDMO updated.

ASN.1 updated.

Change Order 121 - Add attachment information of access control for ObjectCreate, ObjectDelete and AttributeValueChange notifications.

In Section 5.2.3, added text explanation.

Change Order 122 - failed TN List error in ASN.1 modification.

ASN.1 updated.

Change Order 127 - Create default values (not OPTIONAL attributes) for subscriptionEndUserLocationValue, subscriptionEndUserLocationType and subscriptionBillingId.

ASN.1 updated.

Change Order 136 - Remove auto instance naming support in the serviceProv and serviceProvNetwork objects in the MOCS.

MOCS updated.

Change Order 137 - Add LNPType attribute to OldSP_CreateData.

ASN.1 updated.

MOCS updated.

Change Order 138 — Update message flows to portray the NPA-NXX first usage notification going to the accepting Local SMSs after subscription version creation.

Chapter 6, flows 6.5.1.1 and 6.5.1.2, step k, updated to state "accepting Local SMSs".

Change Order 139 — In the ASN.1, remove customer disconnect date field from MismatchAttributes (SEQ3) and SubscriptionData.

Updated ASN.1 and MOCS for removed fields.

Change Order 140 — Need to change the invalid data fields of the OldSP CreateReply, NewSP CreateReply and ModifyReply to be a CHOICE of the fields submitted in the action request.

Updated ASN.1 and MOCS for new fields.

Change Order 141 — Change the subscriptionAuditStatus attribute to be GET not GET-REPLACE in the subscriptionAudit object.

Updated GDMO.

Change Order 143 — Add default value for LRN and make attributes optional.

ASN.1 updated.

Change Order 144 — Add the status attribute value change to the deferred disconnect flow after the status goes to disconnect pending on the NPAC-SMS.

Updated flow 6.5.4.2, Subscription Version Disconnect With Effective Release Date.

Change Order 145 — Flow corrections.

Flows updated.

Change Order 146 — Update the behavior of all LRN and DPC fields to indicate the type of data being stored.

Behaviors updated.

Change Order 147 — Flow corrections.

Flows updated.

GDMO updated.

Change Order 148 — Update the behavior of the subscriptionAudit object to change the reference to the Process Audit Association Function to SCA Management Function.

Behaviors updated.

Change Order 149 — Make DPC and SSN data optional on SubscriptionModifyData.

ASN.1 updated.

Change Order 150 — Change time-of-completion field to a GeneralizedTime field in the LocalSMS ActionResults structure.

Verified change made.

Change Order 151 — In the subscriptionVersionDonorSP.CustomerDisconnectDate make the effectiveReleaseDate an optional field.

Updated ASN.1 structure, VersionCustomerDisconnectDate to make serviceProv effectiveReleaseDate OPTIONAL.

Change Order 152 — Flow corrections.

Flows updated.

Change Order 153 — Add filter support criteria for Local SMSes.

Criteria added to the end of Chapter 4.

Change Order 154 — Update behavior for the InpLocalSMSName and InpNPACSMSName.

Behaviors updated.

Change Order 155 — Change the EndUserLocationValue definition from NumberString(SIZE(12)) to NumberString(SIZE(1..12)).

ASN.1 field updated.

Change Order 156 — In the ASN.1, change the AddressInformation.zipCode field to GraphicString9.

ASN.1 updated.

Change Order 158 — Change the subscriptionVersionNPAC behavior regarding subscriptionVersion0.DonorSP.CustomerDisconnectDate.

GDMO updated.

Change Order 160 — Add subscriptionStatusChangeCauseCode.

MOCs updated.

Chapter 4 attribute table updated.

Change Order 161 — Implement NANC solutions.

GDMO updated.

ASN.1 updated.

Change Order 163 — Update the behavior for subscriptionVersionStatusAttributeValueChange.

GDMO updated.

Change Order 184 — Scoping and Filtering Clarification.

Chapter 5 updated.

Change Order 182 — CMIP bind/unbind information.

Chapter 5 updated.

Change Order 185 — Flow corrections.

Flows updated.

Change Order 189 — Add security address package.

GDMO updated.

Change Order 190 — Add 'downloaddata' before the CHOICE in DownloadReply.

ASN.1 updated.

MOCS updated.

Change Order 190 — Add CCITT reference when deriving from top.

GDMO updated on all objects derived from top.

Change Order 190 — Change serviceProviderDownloadReasonBehavior to servicePrevDownloadReasonBehavior.

GDMO updated.

Change Order 190 — Remove reference to DSET in section 2.2 of the HS.

Reference removed.

Change Order ESI011 — Remove all special references to "Illinois" and integrate in accordance with the NANC flows.

Change Order NANC 16 - Retry clarification is sections 5.2.3 and 5.3.3.1.

Change Order NANC 19 - M-CANCEL-GET Document updated. clarification in section 2.1.

Change Order NANC 21 - Clarification of note in section 6.1.

Change Order NANC 22 - Modification of flow 6.5.6.

Change Order NANC 23 - Modification of flow 6.2.1.

Change Order NANC 24 - Modification of flows 6.5.1.2 and 6.5.1.3.

Change Order NANC 25 - Modification of flows 6.5.4.1 and 6.5.4.2.

Change Order NANC 26 - Modification of flows 6.5.5.2.

Change Order NANC 37 - Primitive error list modifications in Appendix A.

Change Order NANC 38 - Clarification of flow 6.4.1.6.

Change Order NANC 39 - Correction to section 4.2.2.

Change Order NANC 40 - Addition of flows 6.6.4, 6.6.5, and 6.6.6.

Change Order NANC 42 - Addition of section 4.3.

Change Order NANC 50 - Clarification of flow 6.5.1.6.2.

Change Order NANC 52 - Modification of flows 6.5.2.1, 6.5.2.3, and 6.5.3.1.

Change Order NANC 53 - Modifications to Canceled state in section 10.

Change Order NANC 56 - Modifications of flows 6.5.2.3 and 6.5.2.4.

Change Order NANC 57 - Clarification of section 5.2.1.10.

~~Version 1.5.1, released on 03/14/97, contains the following changes:~~

- ~~V 1.5 Change History updated to reflect completion of Change Orders 182 and 189.~~
- ~~Conflict resolution acknowledgment request record removed from Log Record diagram in Chapter 3.~~
- ~~VersionConflictResolutionAcknowledgmentRequest removed from Exhibit 7 in Chapter 4.~~
- ~~NewSPConflictResolutionPending replaced with subscription VersionRemoveFromConflict in Exhibit 10, Chapter 4.~~
- ~~Descriptive text for Flow 6.5.1 in Chapter 6 modified.~~
- ~~Imported current GMDO and ASN.1 chapters.~~

1.4. References

1.4.1. Standards

ANSI T1.224-1992, *Operations, Administration, Maintenance, and Provisioning (OAM&P) - Protocols for Interfaces between Operations Systems in Different Jurisdictions.*

ANSI T1.243-1995, *Telecommunications, Operations, Administration, Maintenance and Provisioning (OAM&P) - Baseline Security Requirements for the Telecommunications Management Network (TMN).*

ANSI T1.246, *Operations, Administration, Maintenance and Provisioning (OAM&P) - Information Model and Services for Interfaces between Operations Systems across Jurisdictional Boundaries to Support Configuration Management - Customer Account Record Exchange (CARE).*

Belcore TA- 1253, *Generic Requirements for Operations Interfaces Using OSI Tools: Network Element Security Administration.*

Committee T1 Technical Report No, 40, *Security Requirements for Electronic Bonding Between Two TMNs.*

ISO/IEC 11183-1:1992, *Information Technology - International Standardized Profiles AOM In OSI Management - Management Communications - Part 1 Specification of ACSE, Presentation and Session Protocols for the use by ROSE and CMISE.*

ISO/IEC 11183-2:1992, *Information Technology - International Standardized Profiles AOM In OSI Management - Management Communications - Part 2: CMISE/ROSE for AOM12 - Enhanced Management Communications.*

- ISO/IEC 11183-3:1992, *Information Technology - International Standardized Profiles AOM In OSI Management - Management Communications - Part 3: CMISE/ROSE for AOM12 - Basic Management Communications.*
- ITU X.509, *Information Technology - Open Systems Interconnection - The Directory Authentication Framework.*
- ITU X.690/ISO IS 8825-1 Annex D, *ASN1/BER Encoding of Digital Signatures and Encrypted Cyphertext.*
- ITU X.741, *OSI Systems Management, Objects and Attributes for Access Control*
- ITU X.803, Upper Layers Security Model.*
- NMF Forum 016, Issue 1.0, 1992, *OMNIPoint 1 Specifications and Technical Reports, Application Services Security of Management.*
- OIW Stable Implementation Agreement, Part 12, 1995.*
- Rec. M.3100:1992 & 1995 draft, *Generic Network Information Model.*
- Rec. X.701 | ISO/IEC 10040:1992, *Information Technology - Open System Interconnection - Common Management Overview.*
- Rec. X.710 | ISO/IEC 9595:1990, *Information Technology - Open System Interconnection - Common Management Information Service Definitions.*
- Rec. X.711 | ISO/IEC 9596-1:1991, *Information Technology - Open System Interconnection - Common Management Information Protocol - Part 1: Specification.*
- Rec. X.720 | ISO/IEC 10165-1:1991, *Information Technology - Open System Interconnection - Structure of Management Information - Part 1 Management Information Model.*
- Rec. X.721 | ISO/IEC 10165-2:1992, *Information Technology - Open System Interconnection - Structure of Management Information: Guidelines for the Definition of Managed Objects.*
- Rec. X.722 | ISO/IEC 10165-4:1992, *Information Technology - Open System Interconnection - Structure of Management Information: Guidelines for the Definition of Managed Objects.*
- Rec. X.730 | ISO/IEC 10164-1:1992, *Information Technology - Open System Interconnection - System Management - Part 1: Object Management Function.*
- Rec. X.734 | ISO/IEC 10164-5:1992, *Information Technology - Open System Interconnection - System Management - Part 5: Event Report Management Function.*
- Rec. X.735 | ISO/IEC 10164-6:1992, *Information Technology - Open System Interconnection - System Management - Part 6: Log Control Function.*
- Rec. X.209: 1988, *Specification for Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*
- Rec. X.690: 1994, *ASN.1 Encoding Rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER), and Distinguished Encoding Rules (DER).*
- Rec. X.208: 1988, *Specification of Abstract Syntax Notation One (ASN.1).*
- Rec. X.680 | ISO/IEC 8824-1: 1994, *Information Technology - Abstract Syntax Notation One (ASN.1) - Specification of Basic Notation.*
- Rec. X.680 Amd.1 | ISO/IEC 8824-1 Amd.1, *Information Technology - Abstract Syntax Notation One (ASN.1) - Specification of Basic Notation 1 Amendment 1: Rules of Extensibility.*

1.5. Abbreviations/Definitions

A-PDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation 1
BER	Basic Encoding Rules
CARE	Customer Account Record Exchange
CER	Canonical Encoding Rules
CLASS	Custom Local Area Signaling Services
CME	Conformance Management Entity
CMIP	Common Management Information Protocol
CMISE	Common Management Information Service Element
CNAM	Caller Id with Name
GDMO	Generalized Definitions of Managed Objects
DER	Distinguished Encoding Rules
DES	Data Encryption Standard
FR	Frame Relay
IEC	International Electrotechnical Commission
ISO	International Organization of Standardization
ISVM	Inter-Switch Voice Mail
LIDB	Line Information Database
LNP	Local Number Portability
LRN	Location Routing Number
LSMS	Local Service Management System
LSPP	Local Service Provider Portability
MAC	Media Access Control
MD5	Message Digest (Version 5)
NE	Network Element
NMF	Network Management Forum
NPAC SMS	Number Portability Administration Center and Service Management System
NPA	Numbering Plan Area
NXX	Exchange
OCN	Operating Company Number
OSI	Open Systems Interconnect
PPP	Point-To-Point Protocol
RFP	Request for Proposal
RSA	Encryption Scheme
SOA	Service Order Activation
TMN	Telecommunications Management Network
SMS	Service Management System
TN	Telephone Number

2

2. Interface Overview

2.1. Overview

This specification defines the interfaces between the NPAC SMS and the service providers' Service Order Entry System and Local SMS. The interfaces, defined using the CMIP protocol, are referred to as the SOA to NPAC SMS interface and the NPAC SMS to Local SMS interface respectively. CMISE M-CREATE, M-DELETE, M-SET, M-GET, M-EVENT-REPORT, and M-ACTION primitives are fully supported in a confirmed mode. The relationship from the SOA to the NPAC SMS is a manager to agent relationship. The relationship between the Local SMS to NPAC SMS is a manager to agent or an agent to manager relationship depending on the function being performed. The SOA and Local SMS interfaces are defined by Association Functions. These functions allow each association to define the services it supports. Association establishment from the SOAs and Local SMSs to the NPAC SMS, Association Function and security for each of these interfaces is discussed in Chapter 5, *Secure Association Establishment*.

Note: The M-CANCEL-GET primitive may not be supported in some NPAC SMS implementations due to the fact that access control information cannot be associated with this PDU and support for this functionality was not determined necessary for the interfaces defined.

The sections that follow provide an overview of protocol requirements and a brief description of the functionality provided in each interface. Complete functional descriptions for the interfaces are provided in the process flow diagrams in Chapter 6, *Message Flow Diagrams*, as well as the behavior for the managed objects.

2.2. OSI Protocol Support

The SOA to NPAC SMS and NPAC SMS to Local SMS interfaces must be implemented over the protocol stack shown in Exhibit 1.

Exhibit 1. NPAC/SMS Primary Network Protocol Stacks

Layer	Mechanized Interface	Function
7	CMIP Agent Server	User
6	CMISE, ACSE, ROSE	Application
5	ANSI T1.224	Presentation
4	ANSI T1.224	Session
3	TCP, RFC1006, TPO	Transport
2	IP	Network
1	PPP, MAC, FRAME Relay, ATM (IEEE 802.3)	Link
	DS-1, DS-0 x n, ISDN, V.34	Physical

Multiple associations per service provider to the NPAC SMS can be supported. The secure association establishment is described in *Chapter 0*.

2.3. SOA to NPAC SMS Interface

The SOA to NPAC SMS interface, which allows communication between a service provider's Service Provisioning Operating Systems and/or Gateway systems and the NPAC SMS, supports the retrieval and update of subscription, service provider, and network information. The following transactions occur to support local number portability functionality:

- SOA requests for subscription administration to the NPAC SMS and responses from the NPAC SMS to the SOA.
- Audit requests from the SOA to the NPAC SMS and responses from the NPAC SMS to the SOA.
- Notifications from the NPAC SMS to the SOA of subscription version data changes, need for concurrence or authorization for number porting, conflict-resolution, cancellation, outage information, or customer disconnect dates.
- Service provider data administration from the SOA to the NPAC SMS.

Mapping of this functionality into the CMIP Definitions is provided in *Chapter 0* (see Exhibit 7.)

2.3.1. Subscription Administration

Service provider subscription administration functionality includes the capability to:

- Create a subscription version
- Cancel a subscription version
- Acknowledge cancellation of a subscription version
- Modify a subscription version or range of versions
- Retrieve a specific subscription version or range of versions
- Activate a version or range of versions
- Disconnect a subscription version or range of versions
- Remove a subscription version from conflict

2.3.2. Audit Requests

Audit functionality allows the SOAs to request audits for a subscription version or group of subscription versions based on a Telephone Number (TN) for a specified service provider or all service provider networks. The action SOA receives discrepancy reports as they are found in the network. Upon audit completion it receives a notification of the success or failure of the audit and the total number of discrepancies found.

2.3.3. Notifications

SOAs are sent notifications to ensure that they are fully informed of relevant events for their subscriptions. Notification of creation, deletion, or data value changes for subscription versions will be sent to the SOA as they occur. Notification will be sent to the SOA if the service provider has not authorized transfer of service for a TN in the amount of time specified in the "Service Provider Concurrence Interval" defined on the NPAC. This notification will indicate to the service provider that authorization is needed